

1 **WHAT IS CLAIMED IS:**

2 1. A compact water filter comprising:

3 a housing comprising

4 a bottom container having a top, a top cavity defined in the top
5 and a water inlet communicated with the top cavity;

6 a pump casing mounted on the top of the bottom container and
7 comprising

8 a volute mounted on the top of the bottom container to
9 cover the top cavity and having a top; and

10 a top casing protruding from the top of the volute and
11 having a top driver chamber, a bottom impeller chamber isolated from the top
12 driver chamber and a water discharge port communicating with the bottom
13 impeller chamber;

14 a cap attached to the top casing to cover and close the top driver
15 chamber; and

16 a packing ring mounted around the top of the bottom container
17 to fasten the bottom container to the volute of the pump casing;

18 a filter mounted and held in the top cavity of the bottom container and
19 having a top and an axial hole; and

20 a water pump mounted in the pump casing of the housing and
21 comprising

22 a driver mounted in the top driver chamber and having two
23 driver field windings mounted in the top driver chamber around the bottom
24 impeller chamber;

1 an impeller holder attached to the top of the filter and having a
2 volute inlet communicating with the axial hole in the filter ; and
3 an impeller rotatably mounted in the bottom impeller chamber
4 and comprising a vertical shaft with a bottom end rotatably mounted in the
5 bottom impeller chamber and multiple vanes, the bottom end of the vertical shaft
6 extended into and held in the volute inlet, and the vanes attached to the bottom
7 end of the vertical shaft to pump water into the water discharge port from the
8 volute inlet as the vertical shaft rotates.

9 2. The compact water filter as claimed in claim 1, wherein the impeller
10 holder further has

11 an annular bottom lip extended into and held in the axial hole of the filter
12 to hold the impeller holder in place; and

13 a top cap coaxially formed with the annular bottom lip and having a top
14 and an inward protrusion protruding inside the top cap from the top;

15 wherein the volute inlet is longitudinally defined through the inward
16 protrusion.

17 3. The compact water filter as claimed in claim 2, wherein

18 the volute further has a bottom with an outer edge and an annular lip
19 radially formed around the outer edge;

20 the bottom container further has an exterior thread formed around the
21 top; and

22 the packing ring further has an interior thread that screws onto the
23 exterior thread on the bottom container and simultaneously clamps the annular
24 lip of the volute to fasten the bottom container to the pump casing.